



# **FORMER W.R. GRACE VERMICULITE EXFOLIATION PLANT Spokane, WA**

*Jed Januch & Keven McDermott*

**Asbestos Site Evaluation, Communication and Cleanup**

**Keystone, Colorado  
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# SITE BACKGROUND

- W.R. Grace operated a vermiculite exfoliation plant at this site between 1951 and 1973.
- The site is now owned by Spokane County, which uses the property to store road maintenance equipment.



# Geography/Affected Area

- Site is located within an urban area, mixed commercial and residential.
- Site is flat with a 30 foot bluff to the north.





# Population Affected

- Residents adjacent to the site
- County employees and visitors
- Transients





# SITE BACKGROUND

- R10 Superfund program conducted a multi-phased site investigation.
- Soil samples were collected and analyzed using PLM and TEM. Results of analysis showed levels of asbestos up to 2% amphibole and up to 3% chrysotile.





# SITE BACKGROUND

- R10 Office of Environmental Assessment (OEA) was asked to conduct three phased study to determine if asbestos in the soil could become airborne and if so at what levels.



# SITE BACKGROUND

- OEA study included:
  - general surveillance of area with bulk samples
  - air monitoring in experimental enclosure after disturbing soil samples from the site
  - on-site air monitoring during small scale simulated tasks









# Mineral Forms of Asbestos

- Libby amphibole
  - actinolite, tremolite, winchite, richterite
- Chrysotile and amosite





# Asbestos-Related Health Effects

- Occupational Exposure
  - anecdotal information from former employees reporting pleural plaques and lung cancer
- Environmental Exposure
  - anecdotal information from former residents near the site reporting lung cancer





# Phase I Soil Sampling

- Methods Used for Phase I
  - PLM - SOP developed by EPA Region 1
  - XRD - EPA Region 10 Method for Compound Identification by X-Ray Diffraction Analysis
- Location of Samples
  - various within the site boundaries
- Number of Samples Analyzed
  - seven analyzed by PLM
  - one composite sample analyzed by XRD



# Phase I Soil Sampling Conclusion

- Problems
  - inconsistency of analytical results
    - different analytical methods seem to identify different mineral types
      - PLM - tremolite
      - XRD - richterite and/or winchite
      - TEM - winchite



# Phase I Soil Sampling

## Analytical Results

- PLM analytical results in R10 study reported as either “present” or “absent”
- PLM analytical results identified only tremolite, actinolite, chrysotile, amosite
- XRD analysis confirmed Libby amphibole



# Phase II & III Air Sampling

- Methods Used
  - PCM - NIOSH 7400
  - TEM - NIOSH 7402 and ISO 10312
- Location of Samples
  - Two from under a building (only one analyzed)
  - Ten Outside
- Number of Samples
  - 23 within glovebox
  - 24 on site





# Phase II & III Air Sampling Conclusion

- Problems
  - fill dirt and volcanic ash covered contaminated soil
  - soil was damp
  - soil was rocky and difficult to disturb with small excavating equipment
  - simulated activities on site generated observable dust which concerned neighbors





P10  
B14

02 5 23





# Phase II & III Air Sampling Analysis

- Mineralogic Asbestos Evaluation
  - winchite, actinolite, tremolite, 1 richterite fiber
  - 53% of all fibers were winchite
  - 52% of all asbestiform minerals had an aspect ratio of  $\geq$  to 20:1
- Specific Counting Procedures or Rules
  - NIOSH 7402 & ISO 10312





# Phase II & III Air Sampling

## Analysis (cont)

- Cleavage Fragments
  - indeterminate
- Estimated Sensitivity of Methods
  - per analytical method
- Deviations from Standard Protocols
  - glovebox



# Phase II & III Air Sampling Analysis (conclusion)

- Issues
  - no standard protocol for glovebox
    - artificial laboratory conditions may not be representative of actual exposures
    - provides qualitative information
    - quantitative data not “real world”



# Phase II & III Air Sampling Results

- Phase II
  - Glovebox Monitors
    - ND - 10.71 f/cc (total asbestiform minerals)
- Phase III
  - Personal Monitors - PCM
    - 0.02 - 0.25 f/cc
  - Personal Monitors TEM
    - ND - 0.045 f/cc



# Risk Characterization

- Phase II
  - Glovebox Monitors
    - Cancer risks up to  $6E-01$  for residents and  $4E-01$  for workers
- Phase III
  - Personal Monitors
    - Cancer risks up to  $2E-02$  for residents and  $1E-02$  for workers

Note: Many uncertainties with risk assumptions and approach





# Phase II & III Air Sampling Results (cont)

- Phase III Area Sampling
  - 2 actinolite fibers
  - 1 winchite fiber
  - 1 chrysotile fiber



# Status of Site

- Site still under investigation
  - Earl Liverman, R10 OSC
- R10 OEA study currently undergoing peer review
- Meeting scheduled with current site owner to discuss next steps



# QUESTIONS????

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